

### Claims

1. A strain of *Bifidobacterium bifidum* capable of producing a galactosidase enzyme activity that converts lactose to a galactooligosaccharide mixture comprising at least one  
5 disaccharide, at least one trisaccharide, at least one tetrasaccharide and at least one pentasaccharide.
2. The strain according to Claim 1, wherein in the galactooligosaccharide mixture the disaccharide is Gal-Gal, the trisaccharide is Gal-Gal-Glc, the tetrasaccharide is Gal-Gal-  
10 Gal-Glc and the pentasaccharide is Gal-Gal-Gal-Gal-Glc where Gal represents a galactose residue and Glc represents a glucose residue.
3. The strain according to Claim 1 or Claim 2, wherein the galactooligosaccharide mixture comprises Gal ( $\alpha$ 1-6)-Gal, Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-4)-Glc, Gal ( $\beta$ 1-3)-Gal ( $\beta$ 1-4)-Glc,  
15 Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-4)-Glc and Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-4)-Glc.
4. The strain according to any one of Claims 1 to 3, wherein the galactooligosaccharide mixture comprises from 20 to 35% w/v of the disaccharide, from 20  
20 to 35% w/v of the trisaccharide, from 15 to 25% w/v of the tetrasaccharide and from 10 to 20% w/v of the pentasaccharide.
5. A strain according to any one of Claims 1 to 4, which is deposited under accession no. NCIMB 41171 at the National Collection of Industrial and Marine Bacteria, Aberdeen, UK on 31 March 2003, or a biologically functional equivalent.  
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6. A galactooligosaccharide composition for promoting specific growth of bifidobacteria comprising, as effective constituents, a mixture of at least one disaccharide, at least one trisaccharide, at least one tetrasaccharide and at least one pentasaccharide.
- 30 7. The composition according to Claim 6, wherein the disaccharide is Gal-Gal, the

trisaccharide is Gal-Gal-Glc, the tetrasaccharide is Gal-Gal-Gal-Glc and the pentasaccharide is Gal-Gal-Gal-Gal-Glc.

8. The composition according to Claim 6 or Claim 7, comprising Gal ( $\alpha$ 1-6)-Gal,  
5 Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-4)-Glc, Gal ( $\beta$ 1-3)-Gal ( $\beta$ 1-4)-Glc, Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal( $\beta$ 1-4)-Glc  
and Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-6)-Gal ( $\beta$ 1-4)-Glc.

9. The composition according to any one of Claim 6 to 8, comprising from 20 to 35%  
w/v of the disaccharide, from 20-35% w/v of the trisaccharide, from 15-25% w/v of the  
10 tetrasaccharide and from 10-20% w/v of the pentasaccharide.

10. A composition for improving gut health comprising a culture of the strain of  
*Bifidobacterium bifidum* according to any one of Claims 1 to 5 in combination with the  
composition according to any one of Claims 6 to 9.

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11. A composition for promoting growth of bifidobacterium according to any one  
of Claims 6 to 9, for use in a method of treatment of a human or animal by therapy.

12. Use of the composition according to any one of Claims 6 to 10 in the preparation of  
20 a medicament for preventing adhesion of pathogens or toxins produced by pathogens to the  
gut wall.

13. Use of the composition according to any one of Claims 6 to 10, in the preparation of  
a medicament for re-establishing a normal gut flora following antibiotic treatment or  
25 surgery.

14. Use of a strain of *Bifidobacterium bifidum* according to any one of Claims 1 to 5 for  
producing the mixture of galactooligosaccharides as defined in any one of Claims 6 to 9.

30 15. Use of the strain according to Claim 5 for producing the mixture of

galactooligosaccharides as defined in Claim 8.

16. Use according to Claim 14 or Claim 15, wherein the mixture of galactooligosaccharides are part of a product for improving gut health.

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17. Use according to Claim 16, wherein the product is selected from the group consisting of dairy products, beverages, infant foods, cereals, biscuits, confectionary, cakes, food supplements, dietary supplements, animal feeds, poultry feeds or any other food or beverage.

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18. A method for the manufacture of a substance for promoting the growth of bifidobacteria characterized in that lactose or a lactose-containing material is treated with a strain of *Bifidobacterium bifidum* according to any one of Claims 1 to 5.

15 19. The method according to Claim 18, wherein the lactose containing material is selected from the group consisting of commercially available lactose, whole milk, semi-skimmed milk, skimmed milk, whey and fat-filled milk.

20 20. The method according to Claim 19, wherein the milk is obtained from cattle, buffalos, sheep or goats.

21. The method according to any one of Claims 18 to 20, wherein following removal of *Bifidobacterium bifidum* cells the substance is spray-dried to produce a powder.